Listing of the Claims

The following listing of claims will replace all prior versions, and listings, of claims in the application. As the restriction requirement in the Office Action of December 9, 2003, addressed all claims, it is understood that at the present time all of claims 103-132 are pending–no claims are withdrawn at the present time.

Listing of Claims:

Claims 1-102 (canceled)

103. (Previously presented): The display of claim 106, said separator comprising an inherent mask between respective picture elements.

104. (Previously presented): The display of claim 103, said plural picture elements comprising volumes of liquid crystal in a medium, said liquid crystal and medium being cooperative for selective operation to scatter or absorb light or to reduce such scattering or absorption.

105. (Previously presented): A display for a Schlieren projection display system, comprising

a liquid crystal display, comprising

plural liquid crystal picture elements selectively operable to affect light by scattering or absorbing light or by reducing such scattering or absorption of light, and

a separator integral with and between respective picture elements,

said separator being substantially non-selectively operable to affect light, and comprising an inherent mask including spacer means between respective picture elements forming a grid of spacers and picture elements,

plural electrical drive means in spaced relation for selectively applying electrical input to respective picture elements,

said spacer means being located in relation to the space between respective electrical drive means,

said liquid crystal picture elements comprising liquid crystal and a medium that are cooperative for selective operation to scatter light for projection or to reduce such scattering or absorption, and

said inherent mask comprising a mask between respective picture elements for transmitting light without substantial scattering.

106. (Previously presented): A liquid crystal display, comprising

plural liquid crystal picture elements selectively operable to affect light by scattering or absorbing light or by reducing such scattering or absorption of light, and

a separator integral with and between respective picture elements,

said separator being substantially non-selectively operable to affect light,

said separator comprising spacer means between respective picture elements forming a grid of spacers and picture elements,

plural electrical drive means in spaced relation for selectively applying electrical input to respective picture elements,

said spacer means being located in relation to the space between respective electrical drive means.

107. (Previously presented): A method of making a display element for a projector, comprising,

dissolving a liquid crystal material in a medium,

curing different portions of the medium differently thereby to allow volumes of liquid crystal to form in respective portions of the medium and to allow portions of the medium to cure substantially without volumes of liquid crystal therein.

108. (Previously presented): The method of claim 107, said curing comprising cross-linking.

109. (Previously presented): The method of claim 107, said volumes being operative to scatter light or to reduce scattering.

110. (Previously presented): The method of claim 107, said curing comprising curing sufficiently slow so liquid crystal leaves the medium.

111. (Previously presented): The method of claim 107, said curing comprising curing sufficiently fast to create volumes of liquid crystal.

112. (Previously presented): The method of claim 107, said curing comprising applying ultraviolet radiation.

113. (Previously presented): The method of claim 112, said curing comprising applying a mask to block ultraviolet radiation from areas where volumes are to occur, applying slow cure ultraviolet radiation to exposed areas to get cured areas without liquid crystal, removing said mask and applying fast cure ultraviolet to get volumes with liquid crystal.

114. (Previously presented): A liquid crystal display system, comprising

a substrate having plural electronic drive elements in spaced apart relation,

plural volumes of liquid crystal in a medium, said volumes of liquid crystal arranged in overlying relation to respective electronic drive elements, said volumes of liquid crystal being selectively operable to scatter light or to transmit light without substantial scattering,

a mask between respective groups of volumes of liquid crystal, said mask being in overlying relation to said substrate and between respective electronic drive elements.

115. (Previously presented): The system of claim 114, said mask being substantially transparent.

116. (Previously presented): The system of claim 114, said mask being substantially non-scattering, said volumes being operative to scatter light in the absence of a prescribed input, and said volumes being operative to reduce scattering in response to a prescribed input.

117. (Previously presented): The system of claim 114, wherein said liquid crystal comprises liquid crystal material having a birefringence in the range of from about 0.12 to less than about 0.12.

118. (Previously presented): The system of claim 114, wherein said liquid crystal device includes a medium having plural volumes containing the liquid crystal material controls the angle of the light scattering as a function of the size of the volumes, and wherein the size of the volumes is in the range of from about 5 microns to less than about 5 microns.

119. (Previously presented): The system of claim 117, wherein the birefringence of the liquid crystal is in the range of from about 0.04 to about 0.08.

120. (Previously presented): The system of claim 114, wherein the volumes of liquid crystal comprise liquid crystal material of relatively low birefringence in a medium that has surfaces to cause scattering of light in the absence of a prescribed input and reduces scattering in response to the prescribed input, wherein the surfaces interact with the liquid crystal material to cause scattering of light, and wherein the surfaces interact with the liquid crystal material to cause scattering of light due to a difference between the extraordinary index of refraction of the liquid crystal material and the index of refraction of the material of the surfaces.

121. (Previously presented): The system of claim 114, wherein the ordinary index of refraction of the liquid crystal is substantially matched to the index of refraction of the medium, and wherein the liquid crystal has positive dielectric anisotropy.

122. (Previously presented): The system of claim 114, wherein the liquid crystal is operationally nematic, operationally smectic or cholesteric.

123. (Previously presented): A projection system in which an image is formed from nonspecular light, comprising

a collimated light input,

a liquid crystal device including liquid crystal material for selectively specularly transmitting light or non-specularly scattering light,

a mask at selected areas of the liquid crystal device for transmitting light without substantial scattering,

projection optics for receiving non-specularly scattered light for projection,

means to block the specularly transmitted light from projection by the projection optics, and

wherein the angle of non-specular scattering is controlled by limiting the liquid crystal material to a birefringence that is about 0.12 or less.

124. (Previously presented): A projection system in which an image is formed from nonspecular light, comprising

a collimated light input,

a liquid crystal device including low birefringence liquid crystal material in volumes in a containment medium for selectively specularly transmitting light or non-specularly scattering light,

a mask at selected areas of the liquid crystal device for transmitting light without substantial scattering,

projection optics for receiving non-specularly scattered light for projection,

means to block the specularly transmitted light from projection by the projection optics, and

wherein the angle of non-specular scattering is controlled by limiting the size of the volumes to about 5 microns or less.

125. (Previously presented): A method of projecting a relatively high contrast image, comprising

directing collimated light through a liquid crystal device that provides selectively transmitting of light or controlled scattering of light,

locating between respective portions of the liquid crystal device a mask for transmitting light without substantial scattering,

using Schlieren optical system discriminating between transmitted light and scattered light, and

projecting the scattered light to form an optical output.

126. (Previously presented): The display of claim 106, said picture elements being arranged in side by side relation, the electrical drive means being at least partly in the space between adjacent picture elements, and said separator being in said space overlying the electrical drive means.

127. (Previously presented): A projection system comprising a liquid crystal display, comprising

plural liquid crystal picture elements selectively operable to affect light by scattering or absorbing light or by reducing such scattering or absorption of light, and

a separator integral with and between respective picture elements,

said separator being substantially non-selectively operable to affect light,

said separator comprising spacer means between respective picture elements forming a grid of spacers and picture elements,

plural electrical drive means in spaced relation for selectively applying electrical input to respective picture elements, and

said spacer means being located in relation to the space between respective electrical drive means; and

said projection system further comprising a projection system in which an image is formed from non-specular light, including a collimated light input to the liquid crystal display, projection optics for receiving non-specularly scattered light from the liquid crystal picture elements of the liquid crystal display for projection, and a stop blocking specularly transmitted light from the liquid crystal display from projection by the projection optics.

128. (Previously presented): The projection system of claim 127, wherein said liquid crystal picture elements comprise liquid crystal material having a birefringence that is about 0.12 or less.

129. (Previously presented): The projection system of claim 127, wherein the liquid crystal picture elements comprise low birefringence liquid crystal material in volumes of a containment medium, and wherein the size of the volumes is about 5 microns or less.

130. (Previously presented): A projection system, comprising a liquid crystal display, comprising

a substrate having plural electronic drive elements in spaced apart relation,

plural volumes of liquid crystal in a medium, said volumes of liquid crystal arranged in overlying relation to respective electronic drive elements, said volumes of liquid crystal being selectively operable to scatter light or to transmit light without substantial scattering,

a mask between respective groups of volumes of liquid crystal, said mask being in overlying relation to said substrate and between respective electronic drive elements, and

the projection system further comprising a projection system in which an image is formed from non-specular light, including a collimated light input to the liquid crystal display, projection optics for receiving non-specularly scattered light from the liquid crystal picture elements of the liquid crystal display for projection, and a stop blocking specularly transmitted light from the liquid crystal display from projection by the projection optics.

131. (Previously presented): The projection system of claim 130, wherein said liquid crystal picture elements comprise liquid crystal material having a birefringence that is about 0.12 or less.

132. (Previously presented): The projection system of claim 130, wherein the liquid crystal picture elements comprise low birefringence liquid crystal material in volumes of a containment medium, and wherein the size of the volumes is about 5 microns or less.